NOTES ON INTERESTING OHIO WILLOWS.

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Among the willows there are, as is well known, very many hybrids and freaks. These escape description in general works because each has an individuality of its own and the treatment of one is of suggestive value only for others. But to the student of dynamic nature these forms are of the most extreme interest as giving some clue to nature's methods of evolution. Likewise they are of interest to the systematist in a negative way because they stand in his way and prevent the perfect classification of all plants into genera and species which he aims to accomplish. This general interest is the apology, if apology be needed, for reporting some of the forms of this sort that have come under observation.

SALIX INTERIOR VAR. WHEELERI Rowlee.

Since Prof. Rowlee's publication not long ago of the variety wheeleri of the common long leaved willow, there has been some question as to its validity. Dr. Rydberg omitted it entirely from his revision of the willows in Britton's Manual. These doubts may be in a great measure due to lack of material of the variety as, indeed, Prof. Rydberg intimated to me in a letter not long since. Neither at Washington nor New York are there specimens nor at the time of publication did Prof. Rowlee himself have flowering material. Fortunately the plant grows abundantly on Cedar Point, and in close proximity to the species, so that there are exceptional opportunities for comparative study of the two.

The two characters on which Prof. Rowlee named the variety were the greater wooliness of the leaves and their relatively greater breadth. All who know the long-leaved willow know how very variable the leaves are, both in shape and pubescence. Young leaves and those at the bases of secondary twigs are broader than others, and when they first appear they are frequently densely covered with wool, though becoming entirely glabrous.

The hairiness does not seem to have much taxonomic significance. Leaves on the same plant vary from one extreme to the other. Narrow leaved plants are almost as likely to be woolly as broad leaved. Variation in hairiness is, so far as the writer can observe, entirely unconnected with variations in other directions.

But in the breadth of the leaves, the Cedar Point plants much exceed the measurements given by Prof. Rowlee. Remaining about the length he describes, they are frequently more than two cm., or twice as broad. In its extreme development this broad leaved form is almost glabrous, not at all hairy as are many of

the half-way forms from which, unfortunately, the type was taken. The extreme forms are generally low, not more than one m. tall, and very bushy in habit, making them easily distinguishable from the typical forms of the species at a distance. Rarely, however, it grows into a more open shrub eight or ten feet tall.

In its flowering habits it carries the peculiarities of Salix interior to an extreme. The species has a habit of sending out secondary aments just below the first to open, so continuing the flowering period until late in the season. In the variety these secondary catkins become so prominent that the inflorescence sometimes takes on a cymose character. Half a dozen catkins are often seen in a cluster, all of about the same age. In the species they come on one by one and are much less noticeble even when as numerous. The flowering period is also distinctly later than with the species. On Cedar point it seems to be at its height about the first of July and continues through the month, tapering off into August. The species growing near by has by the first of July almost passed its flowering time and only a few straggling catkins can be found. It must be added in this connection that nearly all of the plants are staminate. Not over 1 per cent. of them are carpellate. What significance this may have cannot be told as yet.

Altogether the variety is so different from the species that it would be taken for a distinct species on first sight. Because of numerous intermediates such an assumption could not be maintained, but it is the best marked willow *variety* we have in the State.

Salix pentandra in Ohio.

Salix pentandra, the European species corresponding to *Salix lucida*, is not infrequently cultivated in Ohio for its twigs, which are of good quality for basket weaving. It is very similar to the American species and in some forms they can hardly be distinguished. But the European species never has the very long attenuate, ovate leaves so characteristic of vigorous shoots of *Salix lucida*. Its leaves are rather thinner and less glossy, not so different from the ordinary willow leaf as those of *Salix lucida*.

Salix pentandra has not, to my knowledge, been reported as an escape in America. At least it is not included in the Manuals. This makes it of considerable interest to note that two plants have been detected escaped in Ohio. One is from Bridgeport, Belmont county, by Dr. W. A. Kellerman, the other from Columbus. Any possible uncertainty as to identification owing to the similarity to the native species, is much reduced by the fact that both cases are in territory out of the range of *Salix lucida*, which occurs only in the northern part of the State. The reports of the collectors also make it certain that the plants were really wild and not cultivated.

SALIX BABYLONICA X S. FRAGILIS.

This cross is common in Europe but so far as I know has not hitherto been reported in America. It is altogether to be expected and it is very strange that it is so scarce. As is well known, *Salix babylonica* exists in America—with extremely rare exceptions—only as a carpellate plant. The flowers, however, genearlly seem to be fertilized for the capsules fill out well. The natural inference is that the pollen came from either *S. alba* or *S. fragilis*, the most closely related forms. If such be the case it is very strange that these hybridized seeds do not grow into trees more often than they do.

The single plant which I was fortunate enough to find is growing in a quarry near Sandusky, where it has taken root in a waste place from which the stone has been removed. There are no other trees near by, and neither of the parents was seen in the immediate vicinity, though both are common in the region, *Salix babylonica* as an ornamental tree planted in the city yards, and *Salix fragilis* as a very common escape.

Its habit is striking, from a hundred feet away. When I first saw it I commenced to wonder what it could be. The first thought was *Salix nigra*. The leaves are narrow and about the the same color as *S. nigra*. But there is something which gives an impression, when at a distance, different from *S. nigra*, though you cannot tell what it is. When you get up to it you find the leaves glaucous below ! It cannot be *S. nigra*, it does not look like *S. amygdaloides*, nor *S. alba*, nor *S. fragilis*, and so you may go over the catalogue successively denying it a place in any of the species, so peculiar does it seem.

Most of the twigs are long, slender, semipendent. The buds on slender twigs are small, as in the weeping willow, on ranker growth, larger, about midway between the two species. The leaves on the upper branches are small, 6-7 cm. long, 8-10 mm. broad, quite glaucous or only paler beneath, close and even, sharp serrate, with a venation more irregular than that of *Salix fragilis*, primaries close with a strong suggestion of a marginal. On water shoots, the leaves approximate *S. fragilis* more closely in form, being long, 16 cm., and narrow, 2 cm., with more distinct teeth. The veins, too, are more similar to *S. fragilis*, but more irregularity is evident and the marginal is still suggested.

The flowers, especially if they were carpellate, would be very interesting. They might show some peculiarities worthy of note. The identification without them cannot be said to be as positive as it might be. But the leaves are so closely intermediate as to leave but little doubt. If it should turn out to be something else it would be of even greater interest, for it is evidently very different from anything else hitherto discovered in our Ohio flora.

SALIX NIGRA X SALIX AMYGDALOIDES.

The two parents of this hybrid are so common and so closely related—one was formerly considered a variety of the other—that one would expect it to be one of the commonest crosses. But such is not the case. Less than half a dozen plants of it have been found within our borders. This is probably because *Salix amygdaloides* blooms two weeks earlier than *Salix nigra* and the two do not normally overlap, so that there is no chance for crossing. The scarcity of hybrids in this region is more remarkable from the fact that in some localities intermediates are very abundant. In the vicinity of St. Louis, where the southern *Salix longipes* enters in and complicates the matter, Dr. Glatfelter reports that not half the plants are nominal and that there are all sorts of intermediates connecting them.

Prof. A. D. Selby collected the first plant from this State. It is, however, not a good intermediate, but is much closer to *S. nigra*. Later one or two trees were discovered around Columbus. These also were not as nearly half way between the two as might be desired. During the summer just passed a very fine example was found within a stone's throw of the new Lake Laboratory building on Cedar Point.

It is a very fair intermediate between the two species. From a distance it resembles *Salix amygdaloides;* though only a bush in a thicket it has the clean branching habit of *Salix amygdaloides* in contrast to the scraggly habit of the other species. The slender-petioled leaves hang with that peculiar grace characteristic of the Peach-leaved Willow. The buds are nearly as large as in that species, i. e., twice as large as in the Black Willow. But the leaves are lanceolate, neither as broad as one nor as narrow as the other commonly is. The coarser venation is that of *Salix amygdaloides;* there is scarcely any marginal and the primaries are close, ascending. But the smaller veins show a reticulation as fine as in *Salix nigra*. The under surfaces of the leaves show no sign of the glaucescence of *Salix amygdaloides*, but are only slightly paler as in the other species.

AN ABNORMALITY OF SALIX SERICEA.

South of Columbus is a swamp, now nearly drained, which is one of the few places near the city where *Salix sericea* flourishes in abundance. Among several interesting forms growing here is one plant which may be somewhat contaminated with some other species or simply abnormal.

Part of its flowers are exactly as they should be in *Salix sericea* but others have a very peculiar appearance. The rhachis and scales are very wooly, covered with long white hair which all but conceals the capsules. The latter are sometimes covered with

long hair, rather thinly, or are almost glabrous, this last suggesting *Salix cordata*. The leaves, however, show no sign of divergence from *Salix sericea*.

Carpeliferous Filaments in Salix nigra.

There is one class of willow freaks reported commonly by others from other places which have escaped observation, if present, in Ohio. The class contains those forms, certainly more common in *Salix* than in almost any other genus, of plants which have mixed up in some way their staminate and carpellate flowers. All sorts of combinations and mixes of the two kinds of flowers are reported. These forms would be very interesting to experiment upon from a physiologcal point of view, as well as anatomically, for they might throw some light on the problems connected with heredity and plasticity of cells.

The plant is growing in the limestone bed of Jonathan creek at White Cottage, Ohio. It is a shrub 8°–10° tall, with the usual apperance of *Salix nigra*. At the time of collection, 23d of May, it had passed its prime but an abundance of flowering material was yet to be had. At first sight it looked as though it was monœcious, with both sorts of flowers on one plant. Some aments were normally staminate; others were apparently all carpellate; and still others were partly staminate and partly carpellate. But on closer examination it developed that none of the ovularies had stigmas, but that in every case the place of that organ was taken by an anther. The ovularies, moreover, were not one to a flower, but each scale supported several, sometimes as many as five, but more often three or four. Sometimes they were joined together at their bases and radiated in all directions like prongs to some burr. Sometimes the stigmiform anther was sessile without a style; or the style might be quite long. Occasionally the anther was supported on a long filament bearing a conical thickening at the base. Again one carpel may bear two styles, each with an anther. The anthers were all polleniferous and functional; not one appeared withered or blasted. None of the carpels, however, under a low power, show developing ovules. They are frequently hairy-like filaments and were colored yellow like them. It seems most rational to conclude that these pseudo-carpels were homologous to filaments and were influenced in some way to assume their thickened form.

Summer-Flowering Willows.

Occasionally when collecting, one meets with willows flowering late in the summer. In the long-leaved willows this is no remarkable thing, for they have a special adaptation to secure a long flowering period. But in the other groups it is an occurrence rare enough to call for note. During several seasons collecting four

such instances have come to the writer's attention. At least one other instance has been reported previously.* In Ottawa county three years ago a good sized bush of *Salix discolor* was found with many catkins in August. They are not normal but much whiter than ordinary pussies, and many of the capsules are aborted. At Washington, late in the summer of 1902, a solitary carpellate ament was found at the tip of a leafy branch of *Salix sericea*. This lone catkin was of normal appearance but about ready to drop off when noticed The third was a plant of *Salix candida*, at Castalia, the past summer, which had two carpellate aments just about at anthesis in July. These were normal and ordinary in every way except in being borne on leafy branches. Near Big Darby creek, in Franklin county, two plants (carpellate) of *Salix cordata* were found in August, full of blossoms. The two were about a hundred feet apart and entirely unconnected. Why they should both be blooming at the same time is very peculiar—one of the interesting things which have yet to be explained or chance.

All these instances are from among the species which flower earliest in the spring and hence develop their flowers furthest in the fall. It would be quite surprising to find *Salix nigra*, for instance, flowering a second time. In each case, except the reported instance of *Salix humilis*, the flowers were carpellate. This may be mere coincidence. It is difficult to see what reason there could be that the carpellate flowers should be especially liable to be affected in this way. Rather one would expect the staminate aments to furnish the most frequent examples because they seem to develop first in the spring.

*O. A. Farwel, Second Flowering of *Salix humilis*. Bot. Gaz., 11 : 317.